



Evaluating the impact of demand-side management on water resources under changing climatic conditions and increasing population

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Abstract:

This study investigated the effect of increasing population and changing climatic conditions on the water resources of a semi-arid region, the Las Vegas Valley (LVV) in southern Nevada. A system dynamics model was developed for the LVV from 1989 to 2035. The impact of climate change on water demand and the water supply from the Colorado River was modeled, using projections from 16 global climate models for 3 emission scenarios. Variability in water demand and supply under different scenarios of population growth and demand management, including water conservation and water pricing, was evaluated. With the population growth that was projected, if no further demand management policies were implemented, the LVV would not be able to meet the water demand in the near future. However, by combining water conservation and pricing policies, the available supply could last well into the future. The reduction in water demand in 2035 was predicted to be 327 million cubic meters (MCM) for 'status quo' population growth, or 30.6%; 408 MCM for 50% of the projected growth, or 38%; and 511 MCM for no population growth, or 47.8%. Water supply reliability decreased significantly with changing climatic conditions. Therefore, major challenges to water sustainability in the LVV would be due to rapid population growth as well as to climate variability. However, with the combination of reduced population growth rate and water conservation policies, the Colorado River supply could meet the future demand of the LVV most of the time.

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Resource Description

Climate Scenario :

specification of climate scenario (set of assumptions about future states related to climate)

Special Report on Emissions Scenarios (SRES)

Special Report on Emissions Scenarios (SRES) Scenario: SRES A1, SRES A2, SRES B1

Communication:

resource focus on research or methods on how to communicate or frame issues on climate change;
 surveys of attitudes, knowledge, beliefs about climate change

A focus of content

Communication Audience:

Climate Change and Human Health Literature Portal

audience to whom the resource is directed

Policymaker

Exposure :

weather or climate related pathway by which climate change affects health

Food/Water Security

Geographic Feature:

resource focuses on specific type of geography

Freshwater

Geographic Location:

resource focuses on specific location

United States

Health Co-Benefit/Co-Harm (Adaption/Mitigation):

specification of beneficial or harmful impacts to health resulting from efforts to reduce or cope with greenhouse gases

A focus of content

Health Co-Benefit/Co-Harm (Family Planning/Population Reduction):

specification of beneficial or harmful impacts to health resulting from efforts to promote family planning or reduce population growth as a climate change adaptation or mitigation measure

A focus of content

Health Impact:

specification of health effect or disease related to climate change exposure

Health Outcome Unspecified

Intervention:

strategy to prepare for or reduce the impact of climate change on health

A focus of content

Mitigation/Adaptation:

mitigation or adaptation strategy is a focus of resource

Adaptation

Model/Methodology:

type of model used or methodology development is a focus of resource

Exposure Change Prediction

Resource Type:

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format or standard characteristic of resource

Research Article

Timescale:

time period studied

Medium-Term (10-50 years)

Vulnerability/Impact Assessment:

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content